



# UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/752,955

01/07/2004

Gopal Ramachandran

Q90773

4429

23373 7590 10/03/2007  
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EXAMINER

SEVER, ANDREW T

ART UNIT

PAPER NUMBER

2851

MAIL DATE

DELIVERY MODE

10/03/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Interview Summary

Application No.

10/752,955

Applicant(s)

RAMACHANDRAN ET AL.

Examiner

Andrew T. Sever

Art Unit

2851

All participants (applicant, applicant's representative, PTO personnel):

(1) Andrew T. Sever.

(3) Gopal Ramachandran.

(2) Masoud Vakili.

(4) \_\_\_\_\_.

Date of Interview: 19 September 2007.

Type: a) ☒ Telephonic b) ☐ Video Conference  
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.  
If Yes, brief description: \_\_\_\_\_.

Claim(s) discussed: 1 and 43.

Identification of prior art discussed: Lin (2002/0075459), Raskar (US 6,520,647), and Tejima et al. (US 5,274,406).

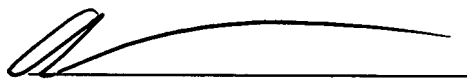
Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See Continuation Sheet.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

  
Examiner's signature, if required

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Applicant's representative faxed purposed amendments (attached hereto) prior to the interview. During the interview the amendments were discussed. The examiner stated that in the examiner's opinion that prior art as cited in the previous office action in some obvious combination (of Lin, Raskar, and Tejima) would read over the proposed amendment. The applicant disagreed. The office proposed the applicant could file an affidavit or declaration under 37 CFR 1.132 showing evidence that the combination would not be obvious or applicant could amend the claims to more specifically claim the structure which differs applicant's invention from the cited prior art which when subject to further search and or consideration may overcome the rejection. However it was stated that the current proposal alone subject to further consideration and/or search would most likely not be sufficient to overcome the rejection .



## FACSIMILE TRANSMITTAL SHEET

TO: Andrew Sever FROM: Masoud Vakili

COMPANY:  
USPTO

DATE:

9/14/2007

FAX NUMBER:

571-273-2128

TOTAL NO. OF PAGES, INCLUDING COVER:

7

PHONE NUMBER:

571 272 2128

SENDER'S FAX NUMBER:

(416) 490-9280

RE:

AN 10/752,955

SENDER'S PHONE NUMBER:

(416) 490-7779

☐ URGENT ☒ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

Andrew,  
please kindly consider for  
next Wednesday @ 2 PM

Thanks  
Masoud

SILICON OPTIX INC.

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Appl. No : 10/752,955 Confirmation No.: 4429  
Applicants : Ramachandran et al.  
Filed : January 7, 2004  
Title : IMAGE PROJECTION SYSTEM AND METHOD  
TC./A.U. : 2851  
Examiner : Andrew T. Sever  
  
Docket No. :  
Customer No. :

Honorable Commissioner for Patents  
P. O. Box 1450  
Alexandria, Virginia 22313-1450

#### AMENDMENT

Sir:

This letter is in response to the Office Action of June 7, 2007.

A listing of claims begins on page 2 of this paper.

Remarks/Arguments begin on page 9 of this paper.

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Amdt. Dated: April 5, 2007  
Reply to Office Action of December 5, 2006

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### Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application. Claims 1, 5, and 21 have been presently amended in this response.

1. (Currently Amended) An off-axis projection system for displaying an image on a display surface based on input image data, comprising:

an image processing unit for receiving the input image data representing a two-dimensional array of pixels, and electronically warping the input image data, prior to projection, to generate two-dimensional electronically warped image data;

a projection light engine having a display device with means to modulate a two-dimensional array of pixels, said light engine being coupled to the image processing unit and adapted for receiving the electronically warped image data, modulating a two-dimensional warped image corresponding to the electronically warped image data on the display device, and projecting the two-dimensional warped image to create a projected image ~~that corresponds to the distortion-compensated image data~~; and,

an optical reflection assembly coupled to the projection light engine adapted to direct the projected image onto the display surface, said optical reflection assembly comprising at least one curved mirror,

wherein, the electronic warping is performed such that in the projected image on the display surface, optical and geometric distortions, including distortions caused in the light engine and the optical reflection assembly, are substantially eliminated.

2. (cancelled)

3. (Previously Presented) The projection system of claim 43, wherein the aspherical rotationally non-symmetric curved mirror has a small degree of horizontal convex curvature on an upper portion and a larger degree of horizontal convex curvature on a lower portion for reducing spatial distortion in the projected image on the display surface.

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an optical reflection assembly coupled to the projection light engine adapted to direct the projected image onto the display surface, said optical reflection assembly comprising at least one curved mirror,

wherein, the electronic warping is performed such that in the projected image on the display surface, optical and geometric distortions are substantially eliminated."

The Applicant has in addition amended Claim 5 of the Subject Application such that it now depends on Claim 43.

#### **Claim Rejections – 35 USC § 103**

##### **Item 8**

On page 4, Item 8, of the OA, the Examiner stated that claims 1, 6, and 16 are rejected under 35 U.S.C 103(a) as being unpatentable over Lin (US 2002/0075459) in view of Raskar (US 6,520,647). The Examiner particularly cited Lin's Figure 2, Numerals 11, 13, and 15, as well as Paragraphs 4 and 6. The Examiner added that Lin does not teach the internal structure of the projector nor its image-processing unit and Raskar teaches a method for correcting keystone in a projector arbitrarily oriented with respect to a display surface, citing Raskar's Column 1 Lines 61-64 and 19-25, Column 3 Lines 45 through Column 4 Line 24, Column 4 Lines 38-44,

In response, the Applicant respectfully submit that no combination of Lin and Raskar could arrive at Claim 1 of the Subject Application as explained below.

Lin teaches mechanical adjustment of a projector via a positioning bracket until the reflection of the image off a seemingly flat mirror is sharp (Lin Paragraph 13 and Figures 1 and 2). Lin's projection system is a simple on-axis projection in a box which uses "a lid for dust protection and esthetic appearance" (Lin Paragraph 14). There is no optimization of screen diagonal over depth of housing. As such, Lin's system projects and image which does not seem to suffer any distortion (or Lin does not mind any distortion or correction thereof) and even the projector could be taken out the housing and used in a totally different mode (Lin Paragraph 14).

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Raskar, on the other hand, teaches a method for automatically correcting keystone in a front projection system using sensors such as laser, magnetic or gyro (Raskar Column 2 lines 48-65). As such, Raskar's teachings are related to purely geometric distortion related to the relative position and orientation of a projector and the projection screen. Raskar does not even address optical distortions. Raskar therefore does not teach or suggest correction for distortions caused by a lens system or an optical reflection assembly having a curved mirror.

The Applicant submits that the currently amended Claim 1 of the Subject Application cites:

"An off-axis projection system for displaying an image on a display surface based on input image data, comprising:

an image processing unit for receiving the input image data representing a two-dimensional array of pixels, and electronically warping the input image data, prior to projection, to generate two-dimensional electronically warped image data;

a projection light engine having a display device with means to modulate a two-dimensional array of pixels, said light engine being coupled to the image processing unit and adapted for receiving the electronically warped image data, modulating a two-dimensional warped image corresponding to the electronically warped image data on the display device, and projecting the two-dimensional warped image to create a projected image ~~that corresponds to the distortion-compensated image data~~; and,

an optical reflection assembly coupled to the projection light engine adapted to direct the projected image onto the display surface, said optical reflection assembly comprising at least one curved mirror,

wherein, the electronic warping is performed such that in the projected image on the display surface, optical and geometric distortions are substantially eliminated."

The Applicant therefore submits that Claim 1 of the Subject Application clearly cites an "off-axis" projection system with "an optical reflection assembly having at least one curved mirror". The distortions caused in such a system are fundamentally different than



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the purely geometric keystone distortions in Raskar's system. Claim 1 of the Subject Application manifestly cites: "optical and geometric distortions are substantially eliminated." Neither Raskar nor Lin address electronic correction in the presence of a curved mirrors. These distortions are clearly not amenable for correction with measurement of angles, nor by repositioning flat mirrors in any orientation as stated in Raskar and Lin respectively.

The Applicant further submits that, even if the Examiner cites the invention of Tejima (US 5,274,406) combined with Lin and Raskar, it would not serve as ground for obviousness against Claim 1 of the Subject Application (For rejecting Claim 21 of the Subject Application, The Examiner cited Claim 1 references plus Tejima et. al. (US 5,274,406) figures 13c, 14a column 4 lines 35-39.). This is clear from Tejima's own teaching: Tejima says in column 7, lines 38-43 that "a curved surface in the reflecting mirror degrades the image and therefore a Fresnel form of mirror implementation is required in order to keep the mirror surface planar". The Applicant therefore submits that this sentence emphasizes on the inventiveness of presently amended Claim 1 of the Subject Application where a curved mirror is used in conjunction with electronic image warping. Electronic distortion correction includes correcting for the residual distortions caused by the optical assembly and the reflection assembly themselves. This is clearly stated in presently amended Claim 1 of the Subject Application where it reads: "wherein, the electronic warping is performed such that in the projected image on the display surface, optical and geometric distortions are substantially eliminated." The Applicant strongly submits that neither Raskar, nor Lin, nor Tejima, nor any combination thereof, addresses electronic correction in the presence of a curved mirror.

The Applicant therefore respectfully submits that the subject matter of Claim 1 of the Subject Application is neither taught nor suggested by Lin or Raskar (or Tejima) or any combination thereof. The Applicant therefore respectfully submits that Claim 1 of the Subject Application is truly inventive and the Examiner's reconsideration is therefore respectfully requested.

**Items 8 and 9-12**